United States Department of Agriculture

Conservation Effects Assessment Project (CEAP)

Jobos Bay Watershed, Puerto Rico: 2007 - 2009

An NRCS Tropical Special Emphasis Watershed

Objectives

Determine environmental effects that agricultural conservation practices implemented by farmers on the uplands may have on coastal waters and associated habitats in tropical ecosystems, and ultimately, to coral reefs.

- Estimate benefits of conservation practices currently present on the landscape.
- Estimate effects of conservation practices on terrestrial and aquatic species and habitat.
- Quantify changes in water quality, sediment chemistry and coral ecosystem response from implementation of conservation management practices.
- Estimate the need for additional conservation practices and the benefits that could be realized if appropriate conservation practices were implemented on all cropland and poultry farms.
- Simulate alternative options for implementing conservation programs on croplands and poultry farms in the future.

Initiated by the Coral Reef Task Force to increase partnerships for coral reef conservation.

Watershed Description

South-central coast of Puerto Rico, Semi-arid Coastal Plain

Size = 10,210 ha (25,219 acres); HUC 2101004

Municipalities - Guayama and Salinas

Total population about 73,000 persons

Predominant land uses are agriculture, including crops such as plantains, bananas, papayas and hayland, and animal operations with poultry and some beef cattle.

Semi-arid climate along the southern coast of Puerto Rico

Average Rainfall (1960 - 1990)			
		Millimeters	Inches
Local Annual		255 - 760	10 - 30
Regional Annual		760 - 1,145	30 - 45
Wettest Month	October	229	9
Driest Month	March	25	1

Temperature shows little seasonal fluctuation

Mean annual temperature 26.6° C, max. 27.4° C, min. 24.8° C

Resource Concerns

- Water Conservation; Water Quality
- Soil Erosion; Soil Quality
- Riparian Ecosystems
- Plant Productivity
- Fish and Wildlife Habitat
- Ecosystem Services

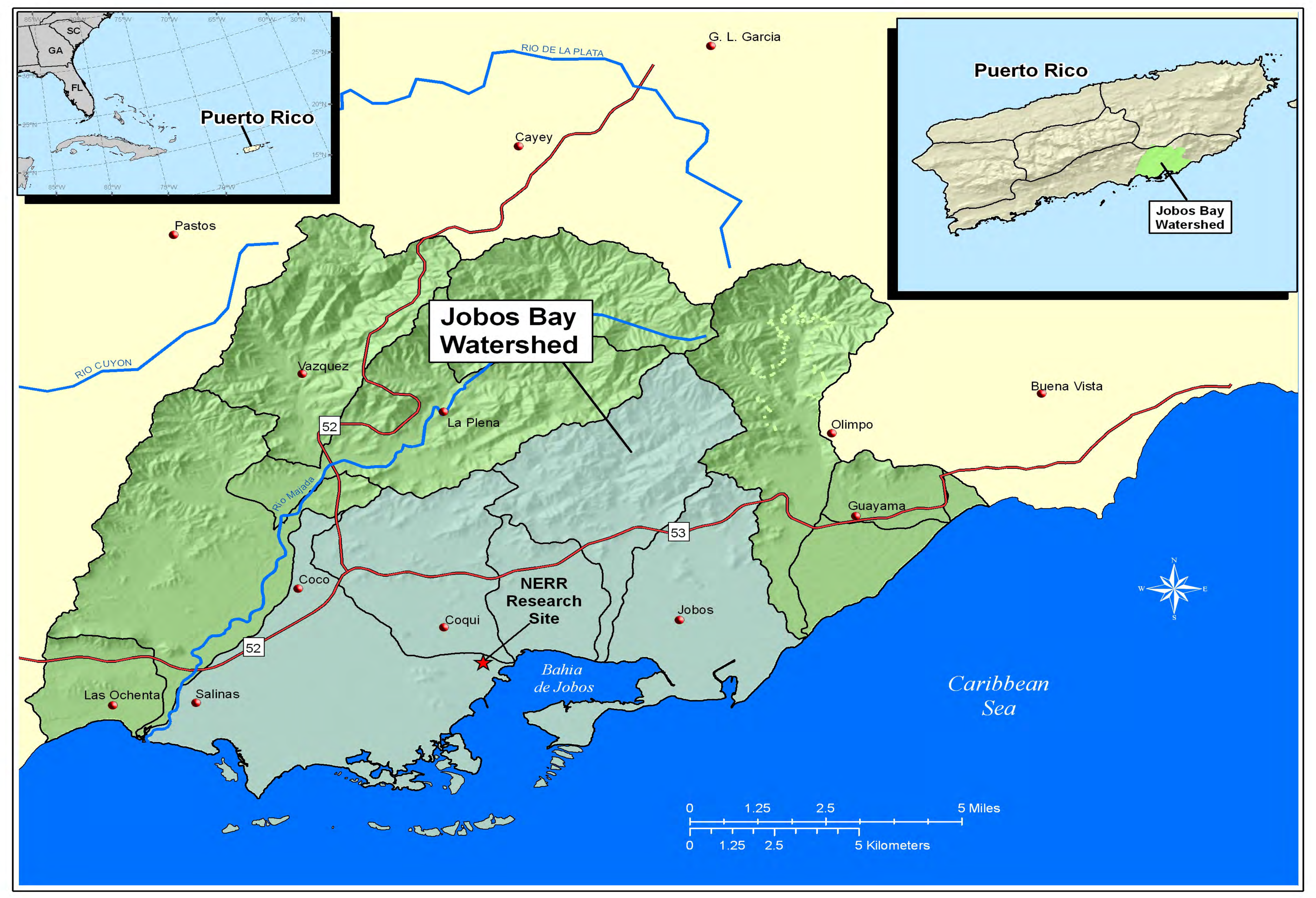

Figure 1. View of coral reef boundary from Cayos Caribes, Jobos Bay NERR

Figure 2. Center pivot irrigation for corn production, Salinas, Puerto Rico

Figure 3. ARS research scientists collect groundwater samples for measuring nutrients and pesticides at the Jobos Bay watershed.

Approach

- ARS will evaluate suitable field and watershed models and will conduct field surveys and analyze field data to calibrate their models.
- NRCS will develop a suite of innovative conservation practices, select willing cooperator farms and generate public outreach documents.
- NOAA will complete Summit to Sea analysis, a GIS characterization of coastal watersheds and predicted pollutant loads, as well as conduct water quality and sediment sampling to develop a comprehensive estuarine monitoring program.

Communicating Results

- Encourage implementation of innovative conservation approaches
- Use CEAP findings to review Caribbean FOTG's and make updates as necessary
- Provide yearly progress and final reports on the JW CEAP project supported by study data
- Develop recommendations for further assessments, evaluations and monitoring

Critical Project Needs Not Currently Being Addressed

- Near-shore oceanographic models
- Deep ground water contributions to Jobos Bay
- Urban, industrial, and other point and non-point source contributions to the bay
- Remote sensing technologies and capabilities
- Mangrove ecosystem interactions with the watershed

Figure 4. Interagency team discusses conservation planning and irrigation management with farmer cooperator, Salinas, Puerto Rico

Collaborators

USDA – ARS
USDA – NRCS
NOAA – Coral Reef Conservation Program
USFWS
USGS
Jobos Bay National Estuarine Research Reserve (NERR)
Puerto Rico Agricultural Extension Service
Puerto Rico Environmental Quality Board
Puerto Rico Land Authority
PR Dept. of Natural and Environmental Resources
University of Puerto Rico – Mayaguez (UPRM)
Sea Grant at UPRM
UPR-Department of Marine Sciences

Contacts

Timothy C. Strickland, Ph.D. [tim.strickland@ars.usda.gov]
USDA-ARS Southeast Watershed Research Laboratory

Mark Walbridge, Ph.D. [mark.walbridge@ars.usda.gov]
USDA-ARS Soil and Water Resource Management

Mark E. Monaco, Ph.D. [mark.monaco@noaa.gov]
NOAA Center for Coastal Monitoring and Assessment

David Whitall, Ph.D. [dave.whitall@noaa.gov]
NOAA Center for Coastal Monitoring and Assessment

Edwin G. Más, M.S. [edwin.mas@pr.usda.gov]
USDA-PR-NRCS Plant Materials/Grazing Lands Specialist
Caribbean CIG/CEAP Coordinator

William R. Effland, Ph.D. [william.effland@wdc.usda.gov]
USDA-NRCS – Resource Inventory and Assessment Division

Howard Hankin [howard.hankin@wdc.usda.gov]
USDA-NRCS – National Aquatic Ecologist

www.nrcs.usda.gov/technical/nri/ceap/